

REMARKS

The Examiner's action and the grounds of objection and rejection stated therein have been carefully considered. Claim 1 has been amended to more clearly recite that the imaging devices are 2D-cameras. The use of 2D-cameras is disclosed in the specification at page 1, line 12 as well as at page 2, line 25 and in Figures 2 and 3. The Examiner notes that the information disclosure statement filed December 17, 2004 fails to comply with 37 CFR 1.98(a)(2) in that copies of the cited foreign patent documents were not furnished. In fact, as can be seen from the attached copy of the receipt card, three foreign patent documents were originally filed with the IDS but must have been separated therefrom before reaching the Examiner. To remedy this situation, the Information Disclosure Statement is resubmitted in its entirety, once again including copies of all cited foreign patent documents.

Claims 1-13 stand rejected under 35 USC 101 because the claimed invention is allegedly directed to non-statutory subject matter. This ground of rejection is respectfully traversed for the reasons set forth hereinafter. The Examiner asserts that the claims are directed to a judicial exception pursuant to the Interim Guidelines on Patent Eligible Subject Matter, stating that the claims must have either physical transformation and/or a useful, concrete and tangible result. Inasmuch as the claims do not recite a physical transformation, the recited subject matter must be useful, concrete and tangible. The Examiner concedes that the claimed subject matter is useful and concrete, but asserts that there does not appear to be a tangible result claimed. Specifically, the Examiner objects that for the results to be tangible, it would need to output to a user, be displayed to a user, stored for later use, or used in any tangible manner and that "using photogrammetrical methods" for determining the three dimensional shape of an interior space is insufficient to constitute a tangible result since the outcome of "using photogrammetrical methods" has not been made available in such a manner that its usefulness in a disclosed practical application can be realized. The Examiner's rationale evidences either a misunderstanding of the Interim Guidelines or of the claimed invention.

The present invention is directed to a method for detecting the three-dimensional shape of interior spaces of products. One very important use of the information produced by this method

is in the production of products which contain interior spaces which, for their functioning, have to fit precisely with body parts. Thus, a limb stump must fit precisely into the prosthesis funnel, which is an interior cavity. If the three dimensional shape of the interior cavity were known, a prosthesis could be produced which would instantly fit the stump. Likewise, for example, for custom made shoes where the foot must fit precisely within the interior space of the shoe. If the three dimensional shape of the inside of the shoe were known, then custom made shoes could be produced which would fit precisely without need for multiple post production fitting and finishing operations. In its broadest embodiment, the invention provides a method for optically detecting the three-dimensional shape of an interior space which is defined by an inner wall comprising the steps of providing an elastic envelope in snug contact with the inner wall and marked with inwardly facing marks adapted to be evaluated photogrammetrically, producing a number of overlapping image recordings of the interior space marked in this way with the aid of one or more 2D-cameras and using photogrammetrical methods for determining from the recordings the three-dimensional shape of the interior space. The Examiner's objection is directed at this last step of using photogrammetrical methods to determine the three-dimensional shape from the recordings.

The purpose of the "useful, concrete and tangible result" standards is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research. The applicant is in the best position to explain why an invention is believed useful in a manner which enables one ordinarily skilled in the art to understand why the applicant believes the claimed invention is useful. Clearly, the foregoing explanation of the usefulness of the present invention, particularly when taken together with the specification, makes clear to one skilled in the art why the present invention is useful. Clearly, also, the present invention, as a method, falls within one of the four categories of inventions that Congress deemed to be appropriate subject matter for a patent.

The Examiner concedes that the invention, as claimed is useful and concrete, but asserts that no tangible result is claimed. The Examiner equates tangible result to a recitation of output to a user or displayed to a user or stored for later use. However, the tangible requirement

does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite subject matter which produces a real-world result. Here the real world result is knowledge of the three-dimensional shape of the interior space. Thus, applicant's invention is a practical method of producing a beneficial result, namely a knowledge of the three-dimensional shape of an interior space to permit the production of custom fitted items. As the Interim Guidelines point out, the opposite meaning of "tangible" is "abstract" and, by no means can the present invention be deemed to be abstract.

The Examiner seems to have difficulty with the language "'using photogrammetrical methods' for determining from said recordings the three-dimensional shape." The term "photogrammetrical methods," and the like, is well known in the art and the specifics of the photogrammetrical methods are disclosed in the PCT applications which are identified on page 5. Merely because the photogrammetric computations may be assigned to a computer does not detract from the fact that the result of the claimed method is tangible, i.e., it produces a real world result which is useful. Language such as is objected to here, namely, "using photogrammetrical methods" (or "using photogrammetry" or "by means of a photogrammetric process") is commonplace in patent claims and is shorthand for the well known method of photogrammetric evaluation of images. See, e.g., U.S. Patent No. 7,095,886 (e.g., claim 30), U.S. Patent No. 7,209,586 (e.g., claims 1-15) and allowed U.S. Application Serial No. 10/472,203 (e.g., claims 1-15, 20—see U.S. Publication No. 1004/0228517). Mere usage of such common terminology cannot convert a useful, concrete and tangible method of determining the three-dimensional shape of an interior space into one which is directed to non-statutory subject matter.

In view of the foregoing, it should be appreciated that the claims of the present application meet all of the statutory criteria of 35 USC 101 and do not fall into any judicial exception, the subject matter being useful, concrete and tangible. Accordingly, the rejection of claims under 35 USC 101 should be reconsidered and withdrawn.

Claims 1, 7-8 and 10-11 stand rejected under 35 USC 103(a) as being unpatentable over Jokinen (U.S. Patent No. 5,706,090) in view of Riegl et al (U.S. Patent No. 6,852,975), the

Examiner stating that Jokinen teaches all features of claim 1 except for producing a number of overlapping image recordings of the interior space with the aid of one or more imaging devices and using photogrammetrical methods for determining from such recordings the three dimensional shape of that part of the interior space that was detected by the overlapping recordings. Riegl et al, according to the Examiner, teaches that it is well known to produce a number of overlapping image recordings of interior space with the aid of one or more imaging devices and using photogrammetrical methods for determining from the recordings the three-dimensional shape of that part of the interior space that was detected by the overlapping recordings. This ground of rejection is respectfully traversed for the reasons which follow.

Jokinen discloses a method for positioning a container for measurement of wear in the container lining. According to Jokinen, the measurement of the wear in the lining is performed by propagation delay measurement of a laser beam. In order to have a fixed reference for the laser measurement, a camera takes a reference picture of a specific arrangement of reference marks. The reference marks are located outside of the container (see Figure 1 and column 3, lines 1-9). No elastic envelope in snug contact with the inner wall and marked with marks facing the inside of the space are provided at all. The Examiner suggests that the lining “3d” of the container is the elastic element; however, that cannot be the case since lining “3d” is the inner wall and no elastic envelope in snug contact therewith is provided. Moreover, Jokinen neither teaches nor suggests using the reference marks and the corresponding pictures taken by the camera in a photogrammetrical manner in order to determine the three dimensional shape of the internal space of the container. The only purpose of the reference marks (P1, P2, P3, P4) and the camera resides in the positioning of the container.

Riegl et al discloses a method for recording an object space with an opto-electronic distance sensor using a signal propagation time method. This measurement principle is based on laser radiation. The laser beam is reflected from objects located in the target space and the propagation delay is measured. (See, Abstract). Using a laser beam for determining a distance is substantially different from using a camera, in particular a 2D camera (see amended claim 1) for measuring the three dimensional shape of an interior space. The present invention is based on overlaying 2D-images for determining the inner dimensions of an object. By contrast, Riegl et al

uses a pointwise scanning with a deflected laser beam. Any specific marks for overlaying pictures are not needed for the laser-based measurement of Riegl et al and Riegl et al discloses no such marks. Moreover, Riegl et al fails to disclose or suggest the photogrammetrical evaluation of 2D-pictures taken from a 2D-camera, which is based on an overlay of overlapping multiple pictures of the interior of an object. Riegl et al also suggests producing a coincident thermal image in parallel to the distance image. However, this further suggestion bears no relevance to applicant's claimed subject matter. Finally, there is no teaching in Riegl et al that the images produced by the laser beam and the thermal sensor are used to provide a three-dimensional picture from the interior of an object by overlapping a plurality of two-dimensional pictures. Accordingly, neither Jokinen nor Riegl et al, separately or together, teach the claimed method and no combination of their teachings can amount to the claimed method. For this reason, the rejections under 35 USC 103(a) over Jokinen in view of Riegl et al do not render any of rejected claims 1, 7-8 and 10-11 unpatentable and should be reconsidered and withdrawn.

With respect to claim 8, the Examiner asserts that the diodes (17, 58, 59) shown in Riegl's Figure 3 form a video camera. However, the diodes detect and measure a single deflected beam of light of a specific frequency. Therefore, these diodes cannot be considered the equivalent of a two dimensional video camera. Even were the Examiner's view assumed to be correct, neither Riegl et al nor Jokinen teach or suggest that the three dimensional shape of the interior space can be determined from multiple such images by overlaying them by using the reference marks and to perform the measurement of the interior space based on the overlaid pictures, as required by claim 1. Riegl et al's and Jokinen's teachings are based solely on the propagation delay of a laser beam. One skilled in the art could not arrive at the subject matter of claim 8, or any other claim, from any teaching of Riegl et al or Jokinen, considered alone or together.


Claims 2, 4-6, 9 and 12 stand rejected under 35 USC 103(a) as unpatentable over Jokinen in view of Riegl et al and further in view of Pelrine (U.S. Patent No. 5,392,715). Pelrine is cited as showing that it is known in the art to provide the side of the marked envelope facing the inner wall with a means adhering to the inner wall prior to insertion into the interior spaces. Pelrine contains no such teaching. Rather, Pelrine deals with an entirely non-analogous

subject matter, namely, in pipe running robots for inspecting the inside of piping, and discloses that such robots may have adherent wheels to be able to run while adhering to running surfaces in vertically extending piping. This disclosure has nothing whatever to do with the claimed subject matter and no combination of this teaching with the deficient teachings of Jokinen and Riegl et al can amount to the claimed subject matter. Accordingly, this ground of rejection should be reconsidered and withdrawn.

Claim 13 stands rejected under 35 USC 103(a) as unpatentable over Jokinen in view of Riegl et al and further in view of Ikeda et al (U.S. Patent No. 5,911,694). Ikeda et al is cited for teaching that it is known for overlapping image fields to be transmitted from the interior space to one or more imaging devices located outside the interior space via an endoscopic system. The use of endoscopes to transmit images from an interior space to an imaging device outside of the interior space is well known, as was pointed out by applicant at page 2 of the specification. No combination of this teaching with the deficient teachings of Jokinen and Riegl et al can amount to the claimed subject matter. Accordingly, this ground of rejection should be reconsidered and withdrawn.

Neither of the primarily relied upon references, Jokinen or Riegl et al, alone or considered together teach or suggest the claimed method of optically detecting the three-dimensional shape of an interior space. Accordingly, claim 1 and the claims dependent directly or indirectly from claim 1, are patentable over the art of record and should be allowed. Applicant gratefully acknowledges the indication that claim 3 contains allowable subject matter. However, inasmuch as applicant believes that all of claims 1-13 are allowable, it has not separately rewritten claim 3 at this time. Reconsideration of all grounds of rejection and an early allowance of claims 1-13 is courteously solicited.

Respectfully submitted,



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